CLAIMS:

1. An implantable bioelectric signal processing system comprising:

a logic circuit adapted for implantation within a living organism, said logic circuit configured to perform analog to digital conversions of received analog bioelectric signals;

an interface operatively coupled to said logic circuit, said interface configured to receive an analog bioelectric signal from at least one electrode implanted in said living organism;

a signal sampling circuit operatively coupled to receive a converted digital signal from said logic circuit; and

a transceiver coupled to said sampling circuit, said transceiver configured to communicate an output signal from said signal sampling circuit to a remote processing system over a wireless communications link.

2. The implantable bioelectric signal processing system of Claim 1 wherein said interface, said logic circuit, said sampling circuit, and said transceiver are disposed within a common matrix configured for implantation within an organism.

3. The implantable bioelectric signal processing system of Claim 1 further including a power distribution means configured to receive electrical power from a remote power source over a wireless link.

4. The implantable bioelectric signal processing system of Claim 1 further including a capacitor circuit operatively coupled to an integrated antenna for receiving wireless power transmissions from an external power source.

5. The implantable bioelectric signal processing system of Claim 1 wherein said sampling circuit is configured for 1-bit sigma/delta sampling of said received digital signals.

6. The implantable bioelectric signal processing system of Claim 1 wherein said interface, said logic circuit, said signal sampling circuit, and said transceiver are implemented on a single integrated circuit.

7. The implantable bioelectric signal processing system of Claim 6 wherein said single integrated circuit utilizes Very Large Scale Integrated circuit architecture.

8. The implantable bioelectric signal processing system of Claim 1 wherein said interface includes a signal amplification component for amplifying said received analog bioelectric signal.

9. A biological organism data acquisition system including:

an implantable logic circuit configured for implantation in an organism;

an electrical winding disposed in proximity to said organism, said electrical winding configured to receive a controlled flow of electrical current from an electrical power source and to generate an electromagnetic field;

an external signal processing system operatively coupled to said implantable logic circuit via a wireless interface, said external signal processing system configured to control a flow of electrical power to said implantable logic circuit through said electrical winding and generated electromagnetic field via an air interface;

wherein said implantable logic circuit is coupled to receive analog bioelectric signals from said organism through at least one implantable electrode disposed within said organism, and to communicate data associated with said analog bioelectric signals to said external signal processing system via a wireless communications link.

10. The biological organism data acquisition system of Claim 9 wherein said implantable logic circuit is further configured to process said received analog signals to obtain said associated data for wireless communication to said external processing system.

11. The biological organism data acquisition system of Claim 10 wherein said implantable logic circuit is further configured to amplify said received analog signals, to convert said received analog signals to digital signals, and to sample said digital signals with a 1-bit sigma/delta sampling process to obtain said associated data for wireless communication to said external processing system.

12. The biological organism data acquisition system of Claim 9 further including an organism containment cage, said electrical winding disposed in proximity to said organism containment cage to generate an

electromagnetic field within said organism containment responsive to said controlled flow of electrical current from said electrical power source.

13. A method for acquiring bio-electric signals from an organism, the method comprising the steps of:

implanting at least one electrode in the organism, said electrode configured to acquire at least one bio-electric signal;

implanting a logic circuit in the organism, said implanted logic circuit coupled to said electrode to receive said acquired bio-electric signal;

providing electrical power to said implanted logic circuit from an external power source;

receiving said at least one bio-electric signal at said logic circuit from said implanted electrode; and

communicating data representative of said received bio-electric signal from said implanted logic circuit to an external data processor via a wireless communications link.

14. The method of Claim 13 further including the step of converting said received bio-electric signals from analog to digital form in said implanted logic circuit, prior to said communicating step.

15. The method of Claim 14 wherein said step of converting includes processing said received bio-electric signal through a sigma-delta analog to digital converter.

16. The method of Claim 13 wherein said at least one electrode is implanted to acquire at least one brain activity bio-electric signal in the organism.

17. The method of Claim 13 wherein said received bio-electric signal is a continuous bio-electric signal.

18. The method of Claim 13 wherein said received bio-electric signal is an evoked bio-electric signal.

19. The method of Claim 13 wherein said step of providing electrical power to said implanted logic circuit includes transferring electrical power from said external power source to said implanted logic circuit over a wireless interface.

20. The method of Claim 13 wherein said step of providing electrical power to said implanted logic circuit includes generating an electro-magnetic field with said external power source;

disposing said implanted logic circuit within said electro-magnetic field; and

extracting electrical power from said electro-magnetic field at said implanted logic circuit.